

ETSI TS 132 260 V12.9.0 (2015-10)



**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Charging management;
IP Multimedia Subsystem (IMS) charging
(3GPP TS 32.260 version 12.9.0 Release 12)**



Reference

RTS/TSGS-0532260vc90

Keywords

GSM,LTE,UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	7
1 Scope	8
2 References	9
3 Definitions, symbols and abbreviations	11
3.1 Definitions	11
3.2 Symbols.....	11
3.3 Abbreviations	11
4 Architecture considerations	13
4.1 High level IMS architecture	13
4.2 IMS offline charging architecture.....	14
4.3 IMS online charging architecture	15
5 Charging principles	16
5.1 IMS charging principles	16
5.1.0 Introduction.....	16
5.1.1 IMS charging applicability	16
5.1.2 IMS charging correlation	16
5.1.2.1 Basic principles for IMS domain correlation	16
5.1.2.2 IMS Charging Identifier	16
5.1.2.2A Related ICID	17
5.1.2.3 Access network charging identifier.....	17
5.1.2.4 Inter Operator Identifier	17
5.1.2.5 Void.....	17
5.1.2.6 IMS visited network identifier	17
5.1.3 SDP handling.....	18
5.1.4 Trigger conditions.....	18
5.1.5 IMS support of real-time tariff transfer.....	18
5.1.6 Served user identification	18
5.1.7 Single charging session from AS/ATCF acting as B2BUA.....	19
5.1.8 Charging support for roaming architecture for voice over IMS with local breakout	20
5.1.9 Charging support for Network provided Location information	21
5.1.9A Charging support for IMS transit scenarios	21
5.1.10 Charging support for TRF.....	21
5.2 IMS offline charging principles.....	22
5.2.1 Basic principles.....	22
5.2.2 Message flows and types	23
5.2.2.0 Introduction.....	23
5.2.2.1 Message flows - successful cases and scenarios	23
5.2.2.1.1 Session establishment - mobile origination	23
5.2.2.1.2 Session establishment - mobile termination	27
5.2.2.1.3 Mid-session procedures	28
5.2.2.1.4 Session release - mobile initiated	30
5.2.2.1.5 Session-unrelated procedures	31
5.2.2.1.6 Session establishment - PSTN initiated.....	32
5.2.2.1.7 Session establishment - IMS initiated.....	33
5.2.2.1.8 Session release - PSTN initiated.....	34
5.2.2.1.9 Session release - IMS initiated	35
5.2.2.1.10 Multi-Party call.....	36
5.2.2.1.11 AS related procedures - AS acting as a redirect server.....	38
5.2.2.1.12 AS related procedures - AS acting as a voice mail server	40
5.2.2.1.13 AS Related Procedures - AS Acting as a SCC AS	41
5.2.2.1.13.0 Introduction.....	41

5.2.2.1.13.1	UE originating call (PS only or CS only).....	41
5.2.2.1.13.2	UE originating call (PS and CS combined origination)	43
5.2.2.1.13.3	UE terminating call (PS only or CS only).....	46
5.2.2.1.13.4	UE terminating call (PS and CS combined origination)	48
5.2.2.1.13.5	Session transfer from PS to CS	51
5.2.2.1.13.6	Session transfer from CS to PS	53
5.2.2.1.13.7	Session transfer from PS to (CS+PS).....	55
5.2.2.1.13.8	Session transfer from (CS+PS) to PS.....	58
5.2.2.1.13.9	IMS emergency session transfer from PS to CS	61
5.2.2.1.14	Initiating alternate charged party call	63
5.2.2.1.15	Session establishment via IBCF to S-CSCF - IMS initiated.....	65
5.2.2.1.16	AS related procedures - AS acting as a MMTel AS	66
5.2.2.1.17	Session establishment via IBCF to a third party AS providing tariff information in real time (RTTI)	66
5.2.2.1.18	Third party AS providing tariff information in real time (RTTI) during the session.....	67
5.2.2.1.19	Support of Optimal Media Routing (OMR)	68
5.2.2.1.19.0	Introduction.....	68
5.2.2.1.19.1	IMS-ALG related procedures for OMR – Session establishment and IMS-ALG bypasses its local GW	69
5.2.2.1.19.2	IMS-ALG related procedures for OMR – session establishment and alternate IP realm is selected	72
5.2.2.1.19.3	IMS-ALG related procedures for OMR – mid-session procedure	74
5.2.2.1.19.4	IMS-ALG related procedures for OMR – transcoding	75
5.2.2.1.19.4.0	Introduction	75
5.2.2.1.19.4.1	IMS-ALG Related Procedures for OMR – transcoder provided by IMS-ALG.....	75
5.2.2.1.19.4.2	IMS-ALG related procedures for OMR – transcoder offered by IMS-ALG but not selected.....	77
5.2.2.1.20	AS acting as a B2BUA – single charging session	79
5.2.2.1.21	Session establishment for roaming architecture for voice over IMS with local breakout	81
5.2.2.1.22	Service continuity using ATCF	83
5.2.2.1.22.0	Introduction.....	83
5.2.2.1.22.1	UE originating call (CS only) through ATCF.....	83
5.2.2.1.22.1A	UE originating call (PS only) through ATCF	85
5.2.2.1.22.2	UE terminating call (CS only) through ATCF	85
5.2.2.1.22.2A	UE terminating call (PS only) through ATCF	87
5.2.2.1.22.3	UE session transfer PS to CS using ATCF	88
5.2.2.1.22.4	UE session transfer CS to PS using ATCF	89
5.2.2.2	Message flows - error cases and scenarios	91
5.2.2.2.0	Introduction	91
5.2.2.2.1	Session related SIP procedures- reception of SIP error messages	91
5.2.2.2.2	Session related SIP procedures - SIP session failure	91
5.2.2.2.3	Session unrelated SIP procedures	92
5.2.2.2.4	CDF connection failure	92
5.2.2.2.5	No reply from CDF	92
5.2.2.2.6	Duplicate detection.....	92
5.2.2.2.7	CDF detected failure.....	92
5.2.3	CDR generation	92
5.2.4	GTP' record transfer flows	92
5.2.5	Bi CDR file transfer	92
5.3	IMS online charging scenarios	93
5.3.1	Basic principles.....	93
5.3.2	Message flows and types	95
5.3.2.0	Introduction.....	95
5.3.2.1	Immediate Event Charging (IEC)	95
5.3.2.1.0	Introduction	95
5.3.2.1.1	Message flows - successful cases and scenarios.....	95
5.3.2.1.1.1	IEC – Debit Units operation	95
5.3.2.1.1.2	Scenarios.....	96
5.3.2.1.2	Message flows - error cases and scenarios	96
5.3.2.1.2.0	Introduction.....	96
5.3.2.1.2.1	Reception of SIP error messages	97
5.3.2.1.2.2	Debit Units operation failure.....	97

5.3.2.1.2.3	Duplicate detection	97
5.3.2.2	Event Charging with Unit Reservation (ECUR) and Session Charging with Unit Reservation (SCUR)	97
5.3.2.2.0	General	97
5.3.2.2.1	Message flows - successful cases and scenarios.....	97
5.3.2.2.1.1	ECUR and SCUR - Reserve / Debit Units operations	97
5.3.2.2.1.2	Expiration of reservation validity	97
5.3.2.2.1.3	Scenarios.....	97
5.3.2.2.1.3.1	Session related procedures (SCUR)	98
5.3.2.2.1.3.2	Session unrelated procedures (ECUR)	107
5.3.2.2.2	Message flows - error cases and scenarios	109
5.3.2.2.2.0	Introduction.....	109
5.3.2.2.2.1	Reception of SIP error messages	109
5.3.2.2.2.2	Debit / Reserve Units operation failure.....	109
5.3.2.2.2.3	Duplicate detection	109
5.3.2.2.2.4	Aborted session setup	109
5.3.2.3	IMS service termination by OCS	109
5.3.2.3.0	Introduction	109
5.3.2.3.1	Triggers on Ro interface which imply the termination of the IMS service	109
5.3.2.3.2	Indication to the UE of the reason for IMS service release	110
6	Definition of charging information	111
6.1	Data description for IMS offline charging	111
6.1.1	Rf message contents.....	111
6.1.1.0	Introduction.....	111
6.1.1.1	Charging Data Request message	111
6.1.1.2	Charging Data Response message.....	112
6.1.2	GTP' message contents	112
6.1.3	CDR description on the Bi interface	112
6.1.3.1	CDR content description	112
6.1.3.2	CDR triggers	113
6.1.3.2.1	Session related CDRs	113
6.1.3.2.2	Session unrelated CDRs	113
6.1.3.3	S-CSCF CDR content	114
6.1.3.4	P-CSCF CDR content	119
6.1.3.5	I-CSCF CDR content	123
6.1.3.6	MRFC CDR content.....	126
6.1.3.7	MGCF CDR content	130
6.1.3.8	BGCF CDR content	133
6.1.3.9	SIP AS CDR content.....	136
6.1.3.10	IBCF CDR content.....	141
6.1.3.11	E-CSCF CDR content	145
6.1.3.12	TRF CDR content	149
6.1.3.13	ATCF CDR content.....	153
6.1.3.14	TF CDR content	157
6.2	Data description for IMS online charging	161
6.2.1	Ro message contents	161
6.2.1.0	Introduction.....	161
6.2.1.1	Debit / Reserve Units Request message	162
6.2.1.2	Debit / Reserve Units Response message.....	163
6.3	IMS charging specific parameters	164
6.3.1	Definition of IMS charging information.....	164
6.3.1.0	General	164
6.3.1.1	IMS charging information assignment for Service Information	164
6.3.1.2	Definition of the IMS Information	164
6.3.2	Detailed message format for offline charging.....	167
6.3.3	Detailed message format for online charging	170
6.3.4	Formal IMS charging parameter description	174
6.3.4.1	IMS charging information for CDRs	174
6.3.4.2	IMS charging information for charging events	174
Annex A (informative):	Bibliography	175

Annex B (informative):	Message flows for service termination by OCS.....	176
B.0	General	176
B.1	Scenario 1 - session related (SCUR): service termination on reception of an initial SIP INVITE request	176
B.2	Scenario 2 - session related (SCUR): service termination triggered after an early SIP dialog is established	177
B.3	Scenario 3 - session related (SCUR): service termination triggered after a confirmed SIP dialog is established	180
B.4	Scenario 4 - session unrelated (ECUR): service termination on reception of an initial non-INVITE SIP request	183
B.5	Scenario 5 - session unrelated (IEC): service termination on reception of an initial non-INVITE SIP request.....	184
Annex C (informative):	Change history	185
History		188

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document is part of a series of Technical Specifications (TSs) that specify charging functionality and charging management in GSM/UMTS networks. The GSM/UMTS core network charging architecture and principles are specified in document TS 32.240 [1], which provides an umbrella for other charging management documents that specify:

- the content of the CDRs per domain and subsystem (offline charging),
- the content of real-time charging events per domain / subsystem (online charging);
- the functionality of online and offline charging for those domains and subsystems;
- the interfaces that are used in the charging framework to transfer the charging information (i.e. CDRs or charging events).

The complete document structure for these TSs is defined in TS 32.240 [1].

The present document specifies the offline and online charging description for the IP Multimedia Subsystem (IMS), based on the functional descriptions of the IMS in TS 23.228 [200]. This charging description includes the offline and online charging architecture and scenarios specific to IMS, as well as the mapping of common 3GPP charging architecture specified in TS 32.240 [1] onto IMS. It further specifies the structure and content of the CDRs for offline charging, and the charging events for online charging. The present document is related to other 3GPP charging TSs as follows:

- The common 3GPP charging architecture is specified in TS 32.240 [1];
- The parameters, abstract syntax and encoding rules for these CDR types are specified in TS 32.298 [51].
- A transaction based mechanism for the transfer of CDRs within the network is specified in TS 32.295 [54].
- The file based mechanism used to transfer the CDRs from the network to the operator's billing domain (e.g. the billing system or a mediation device) is specified in TS 32.297 [52].
- The 3GPP Diameter application that is used for IMS offline and online charging is specified in TS 32.299 [50].

All terms, definitions and abbreviations used in the present document, that are common across 3GPP TSs, are defined in the 3GPP Vocabulary, TR 21.905 [100]. Those that are common across charging management in GSM/UMTS domains, services or subsystems are provided in the umbrella document TS 32.240 [1] and are copied into clause 3 of the present document for ease of reading. Finally, those items that are specific to the present document are defined exclusively in the present document.

Furthermore, requirements that govern the charging work are specified in TS 22.115 [101].